

Big Data for Congestion Management on Arterials



Sandra Lennie, PE

Agenda



1. Background

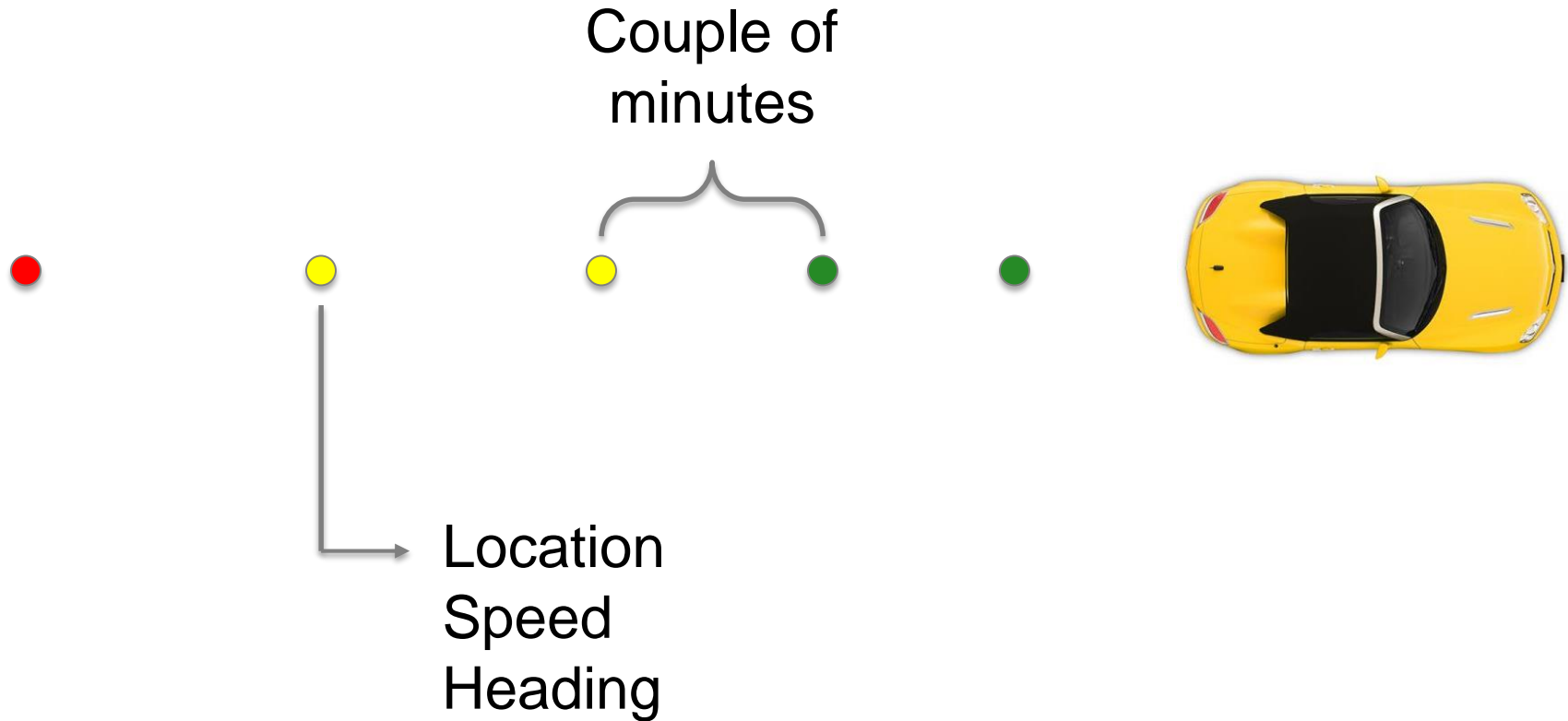


2. Carson Corridor

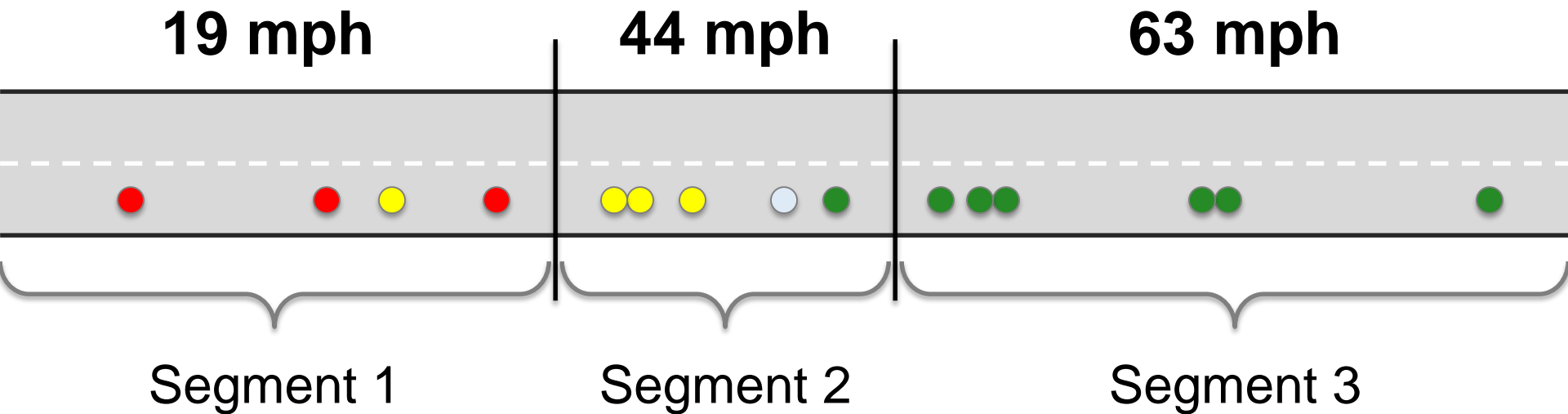


3. Marietta Performance Monitoring

What is big data?



What is big data?



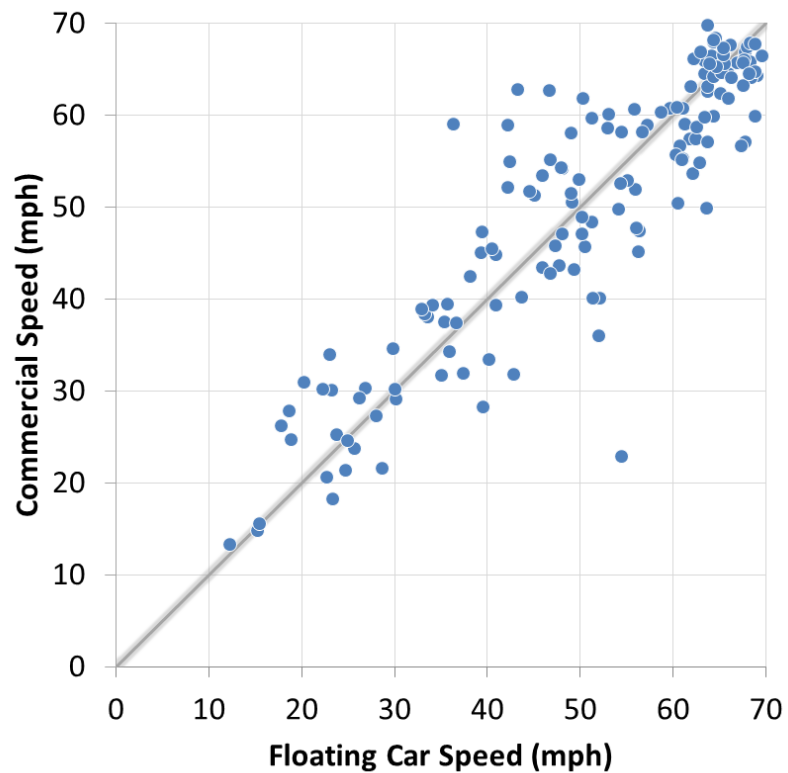
@ 7:14 AM

How does big data help?

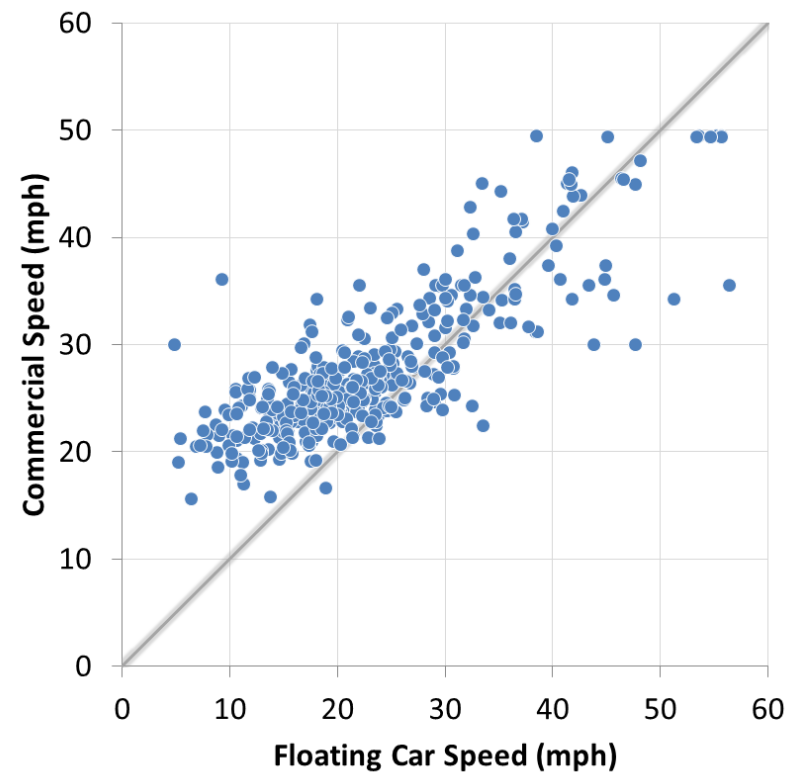
- **Greater accuracy**
 - Current approaches not statistically sound
 - (More vehicles) X (More times) X (More days)
- **Reduced costs**
 - Travel time runs are expensive
 - Probe data is cheaper

INRIX validation

2012 Freeways



2012 Arterials



MAP-21 Implementation Schedule

Area	#	2014				2015				2016			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Planning	1		●	■	■	■	■						
Safety	3	●	■	■	■	■							
Conditions	2					●	■	■	■				
Congestion	1						○	■	■				
Transit	3						○	■	■				

Draft Rules

Rule Making Finalized

Measure Implementation

System Performance / Congestion

	Delay	Reliability
Units	vehicle hours	percentile
Coverage	National Highway System	
Required Data	1. Segment volumes 2. Segment speeds	1. Segment travel times
Segments	Agency defined	
Targets	Agency defined	

Agenda



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Carson Boulevard



Eight intersections

1.8 miles

Retiming & coordinating

- 6:00 AM to 9:00 AM
- 9:00 AM to 3:00 PM
- 3:00 PM to 6:00 PM

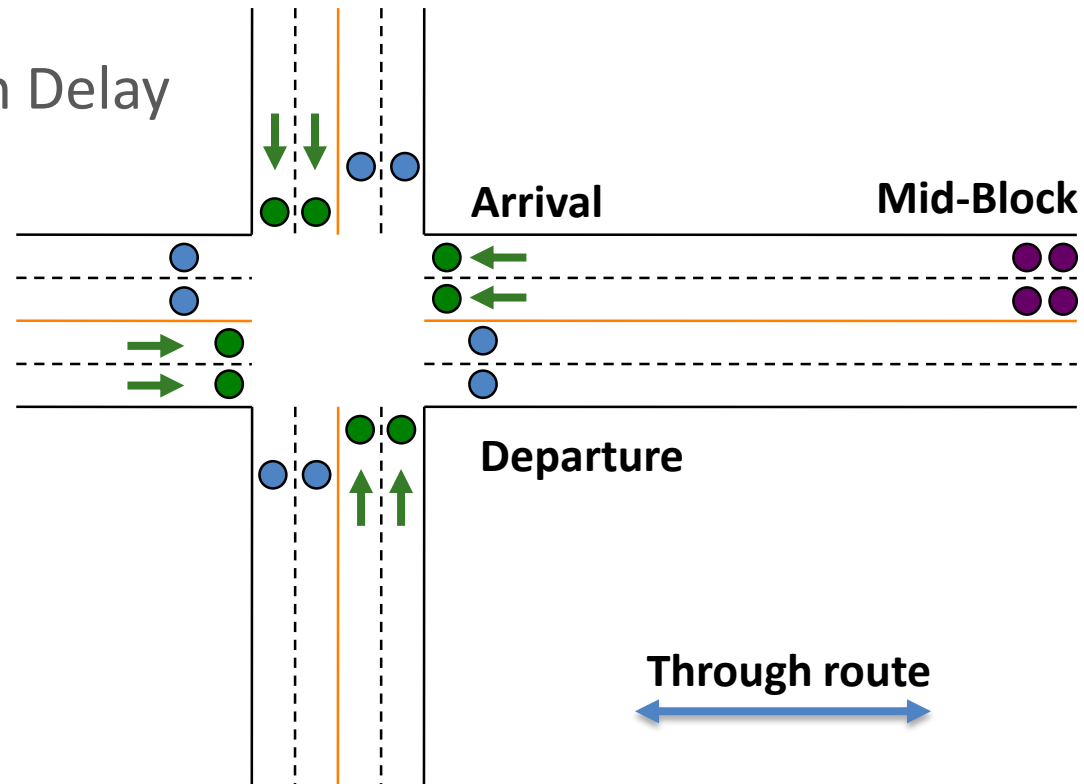


Carson Boulevard

- Applying big data analytics to signal re-timing
(Continuous high resolution measured data)

- Performance Measures

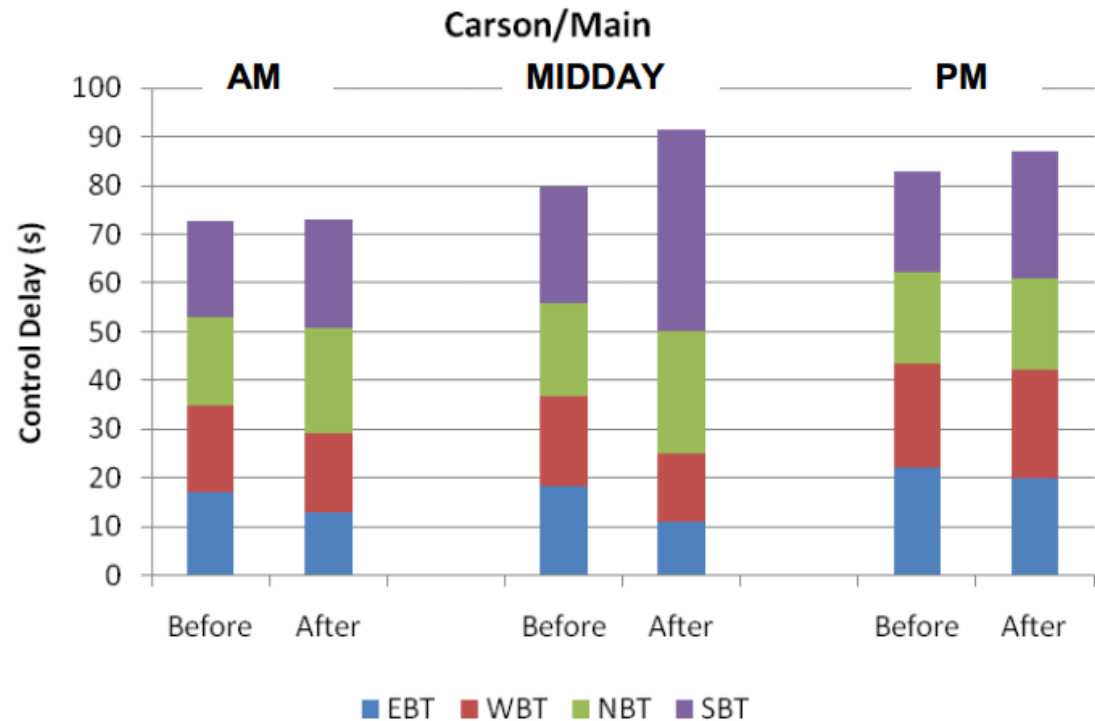
- Control/Intersection Delay
- Travel time
- % arrival on green



Control Delay

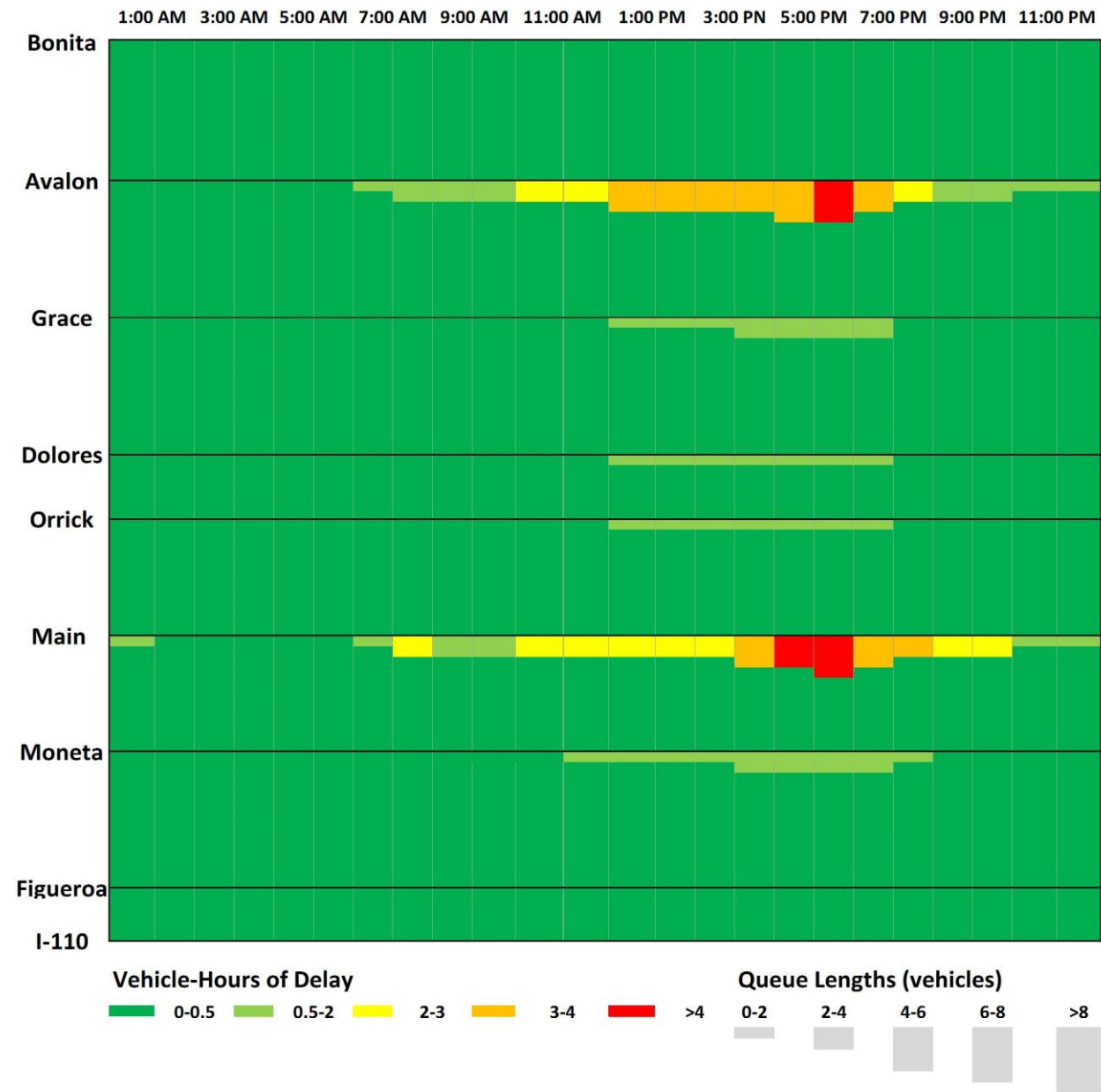
- Results
 - 2-32% reduction in control delay on Carson approaches
 - Side streets incurred more delay

Control Delay Comparison



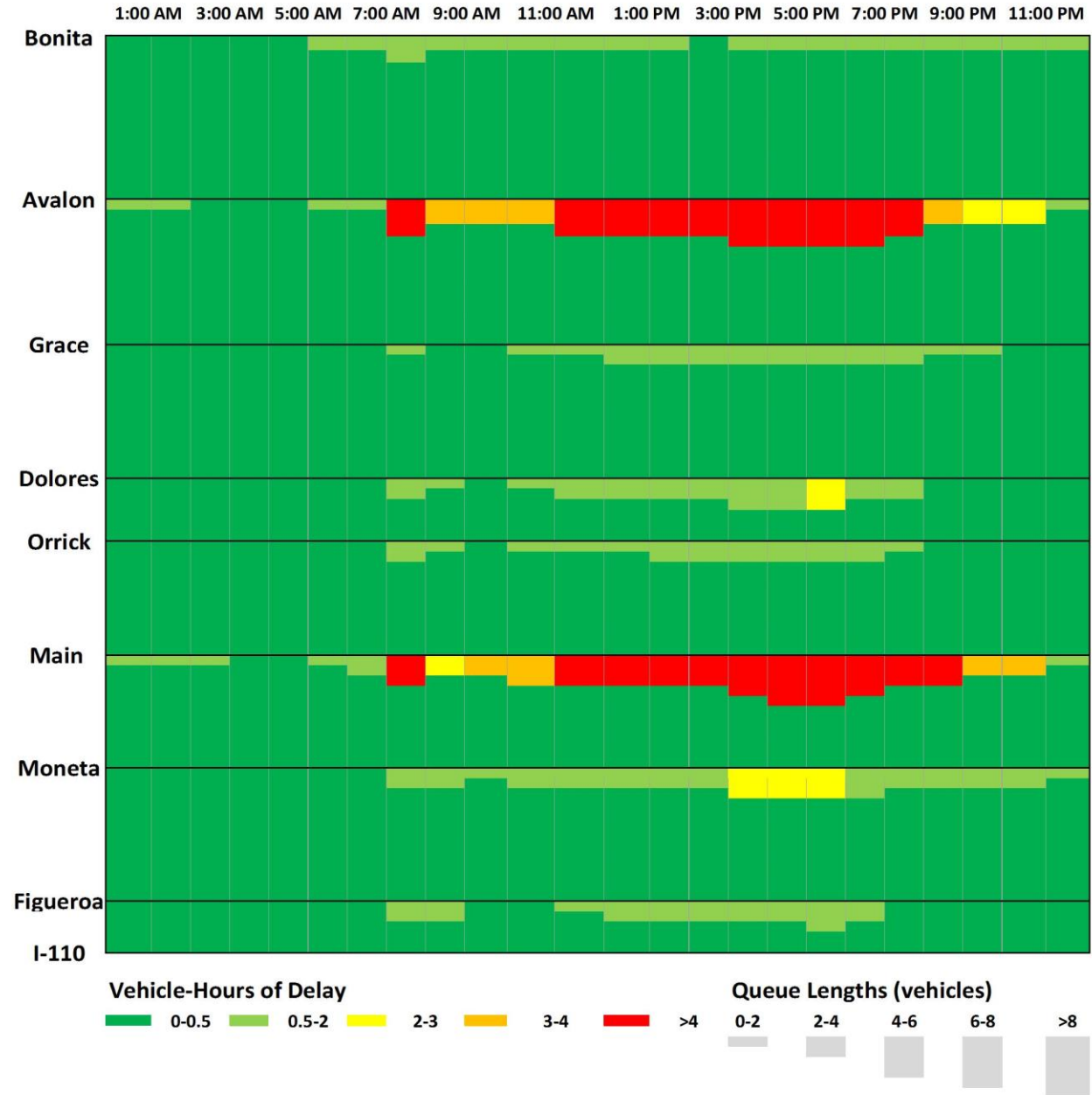
Total Delay & Queue Lengths

- Weekday Average
- Eastbound Carson



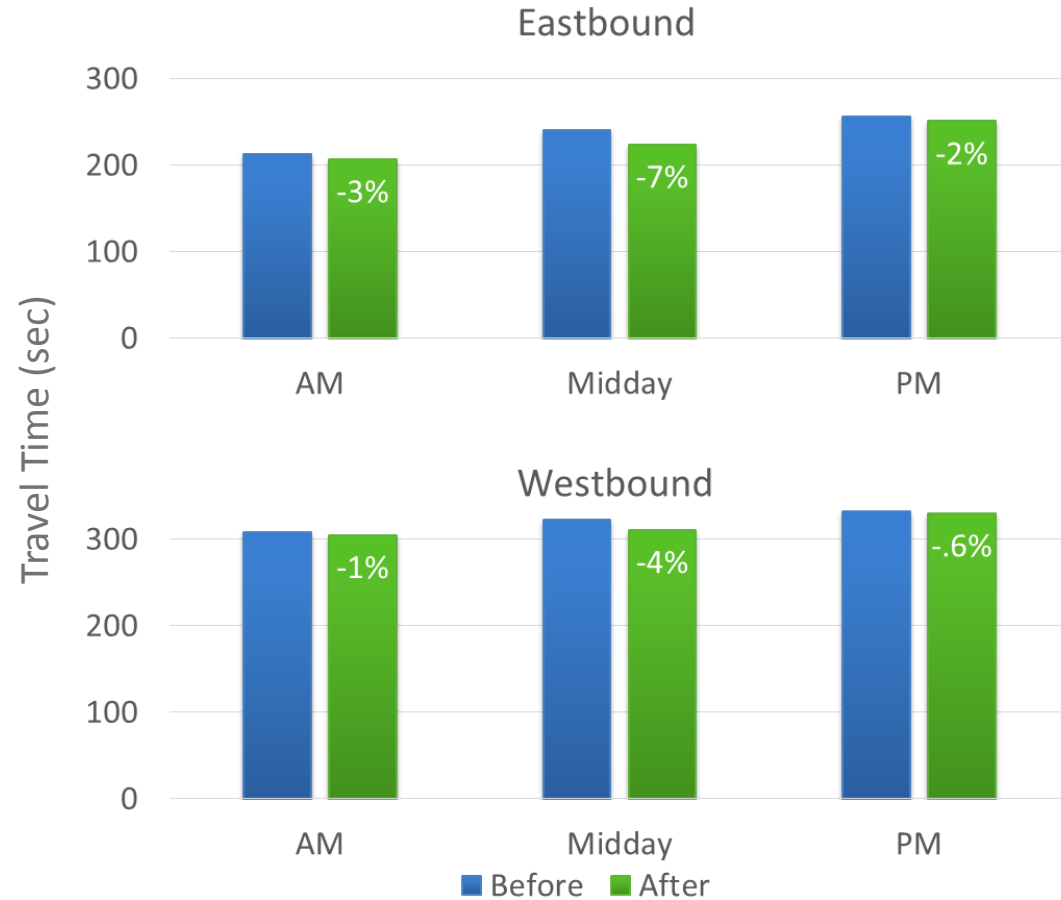
Total Delay & Queue Lengths

- 95th
Percentile
- Eastbound
Carson



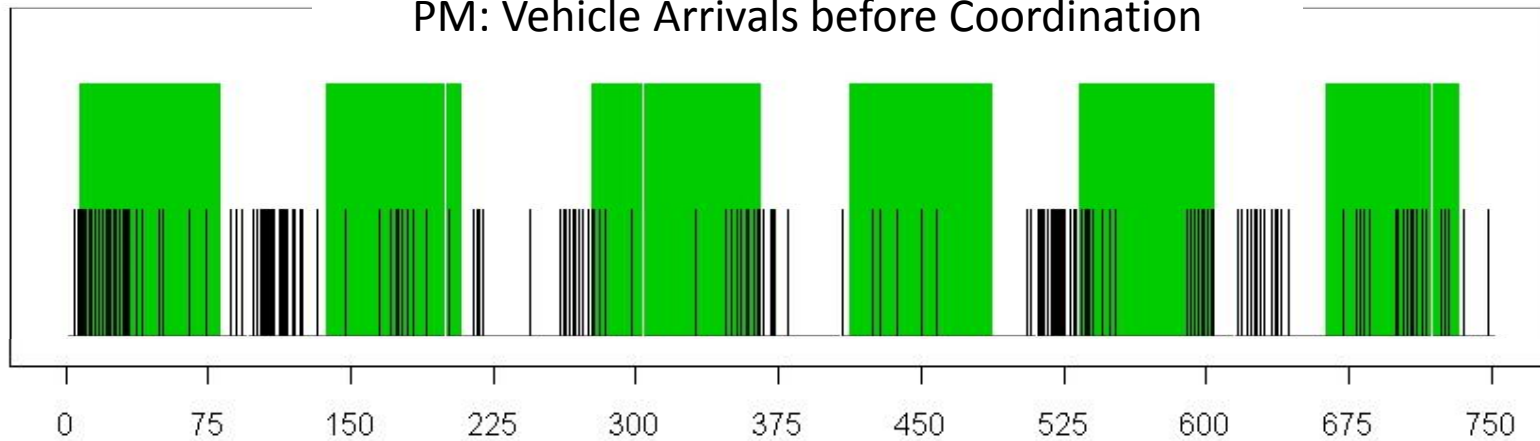
Travel Time

- Measured using Mid Block Detectors and control delay

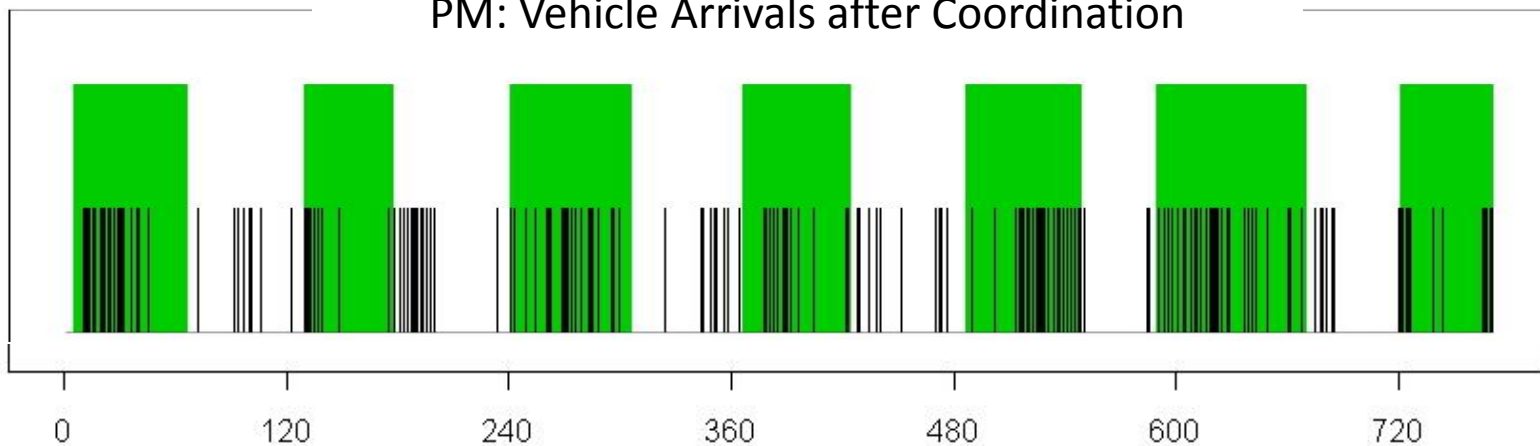


% Arrivals on Green

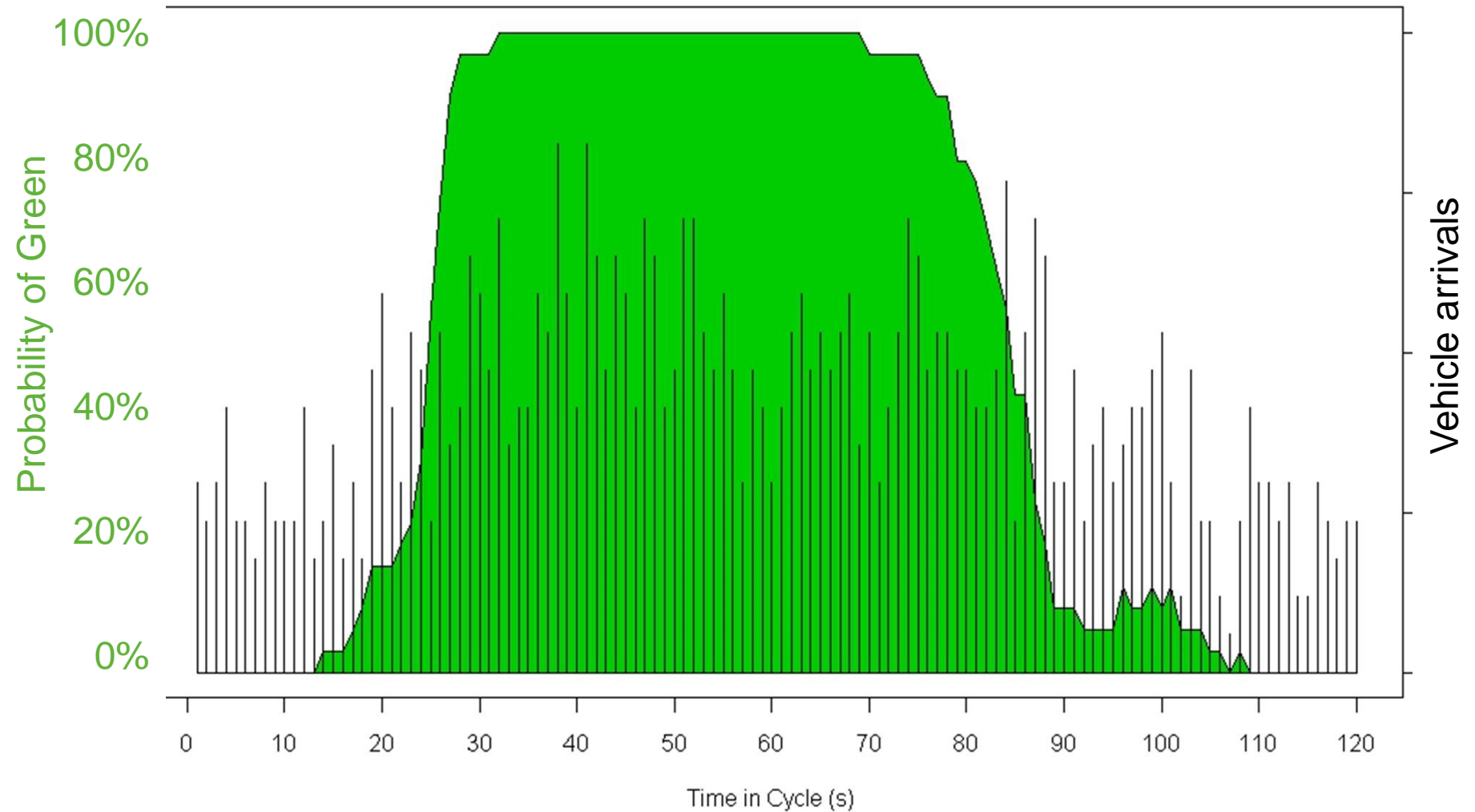
PM: Vehicle Arrivals before Coordination



PM: Vehicle Arrivals after Coordination



Vehicle Arrivals during Cycle, 5:00 PM to 6:00 PM



60% arrivals
on green

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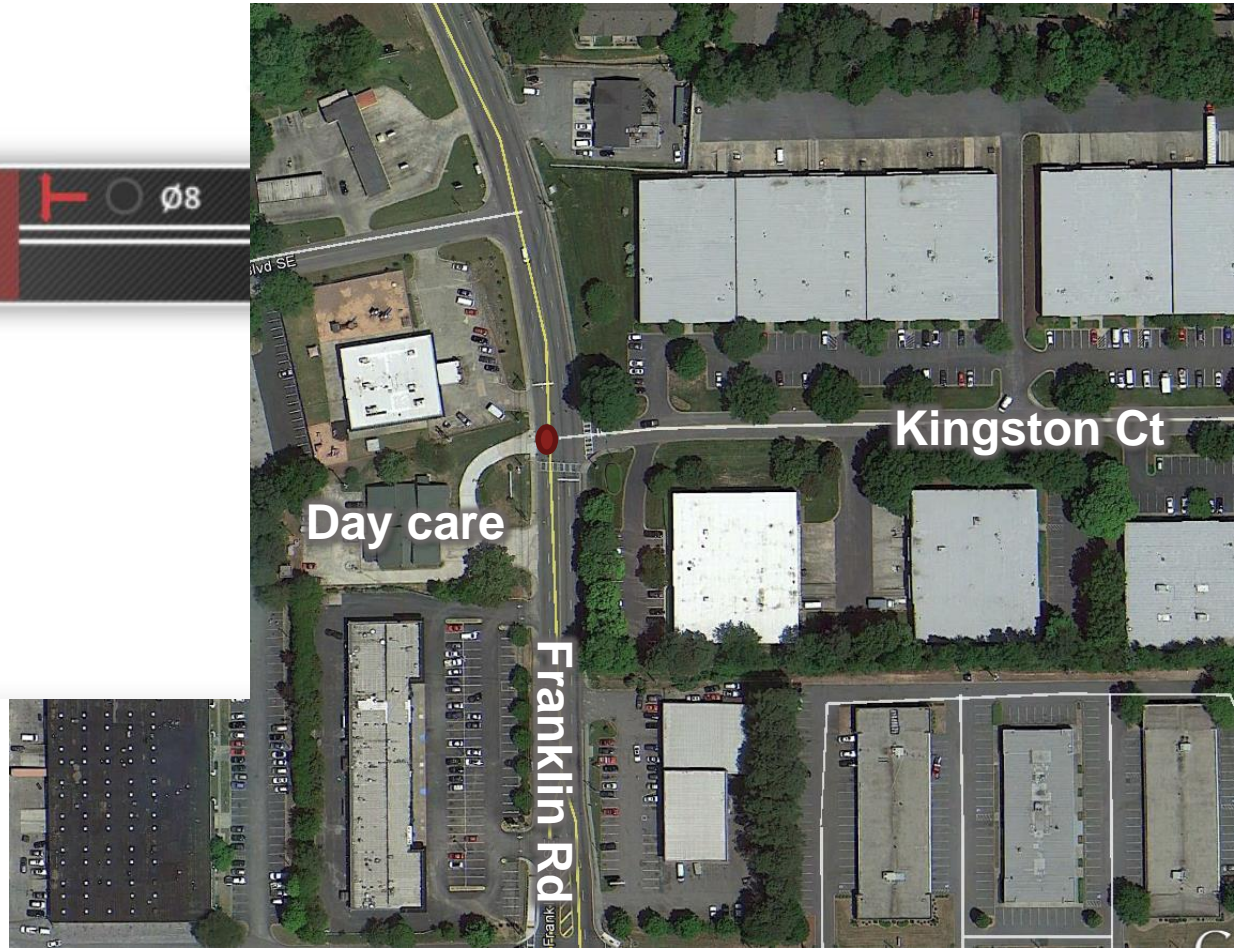
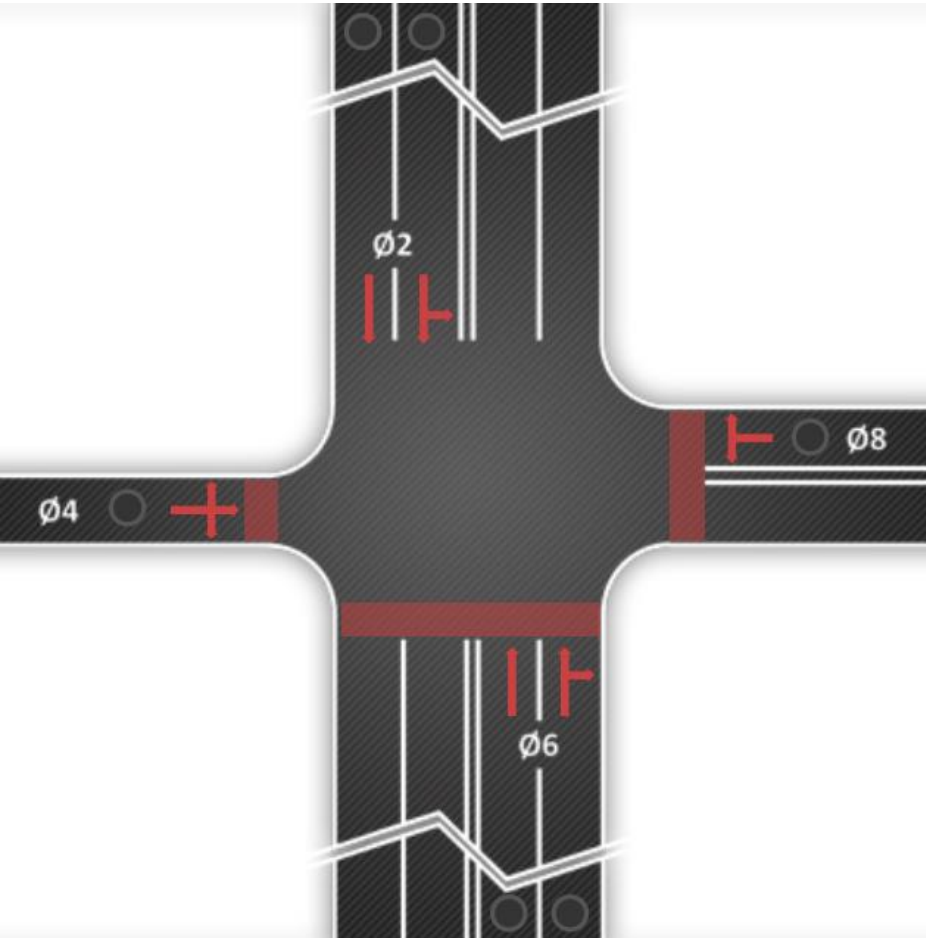


2. Carson Corridor

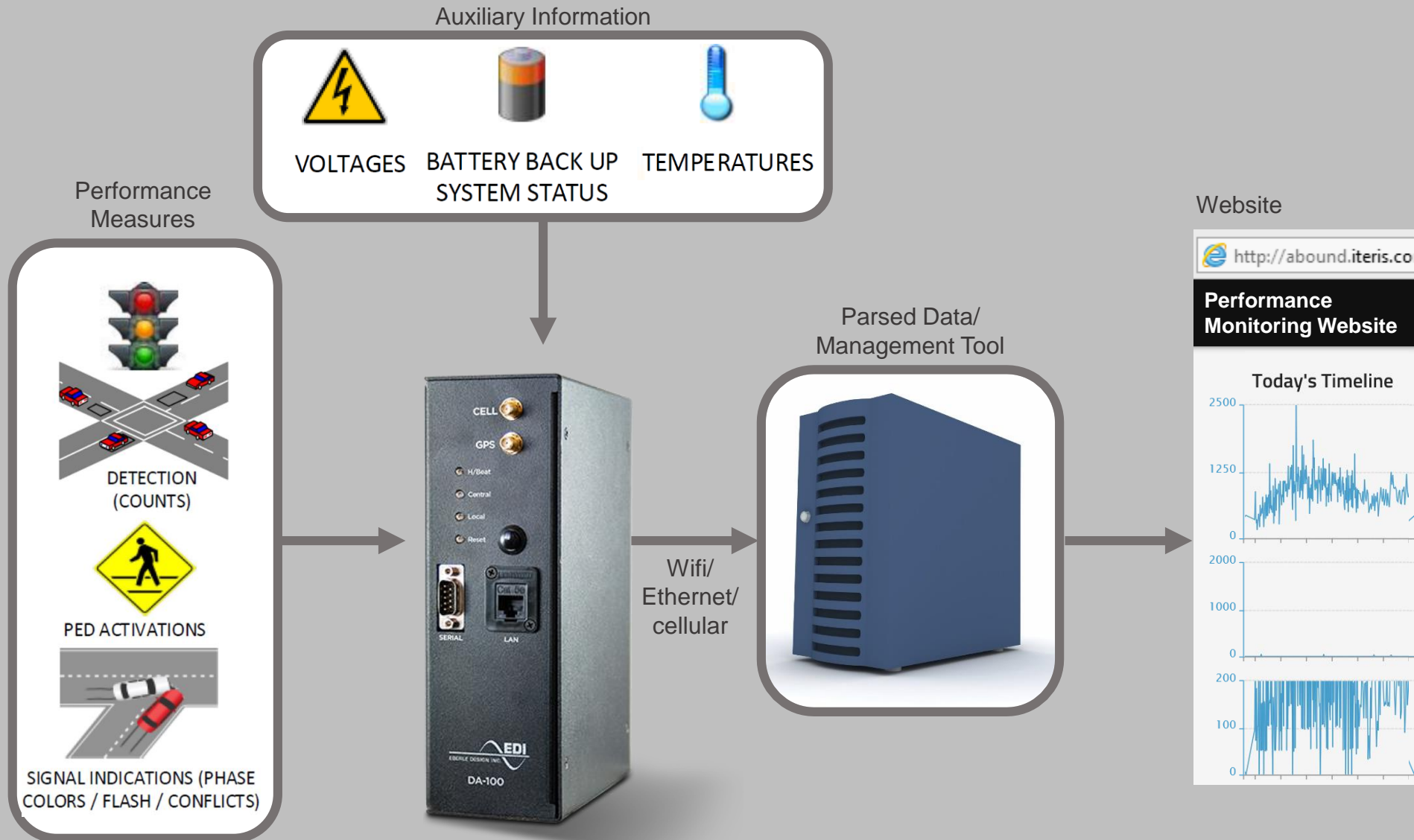


3. Marietta Performance Monitoring

City of Marietta



Intersection Data Aggregator



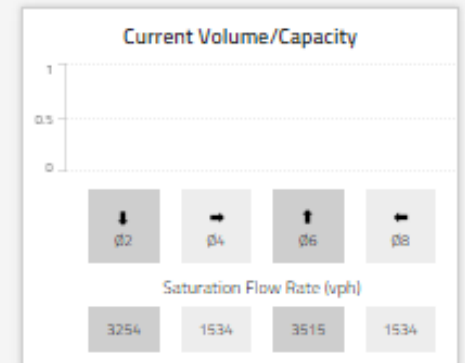
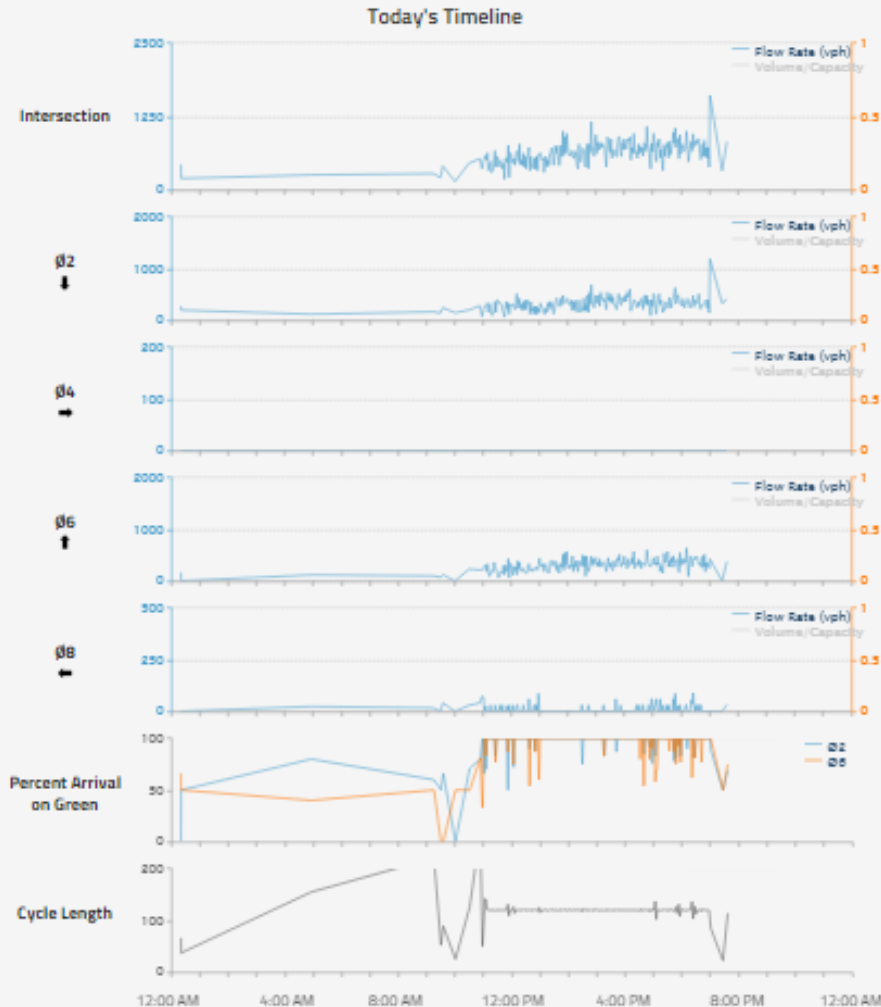
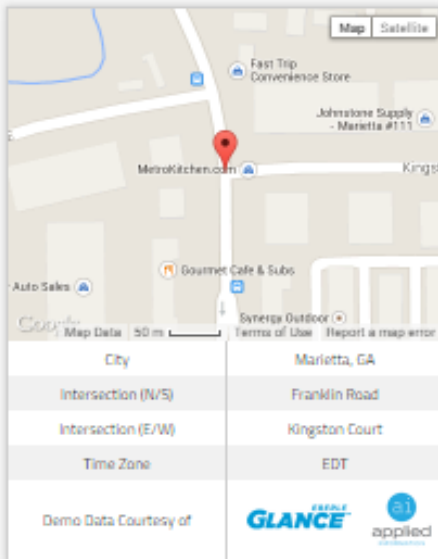
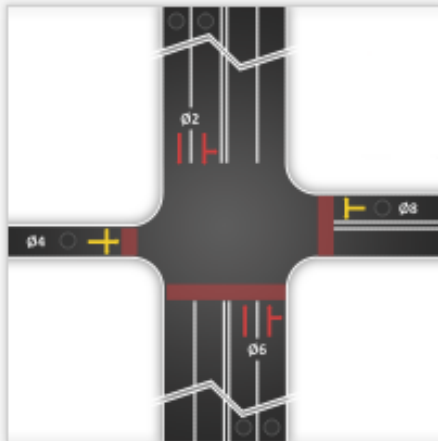
Real-time Intersection Monitoring

iPeMS^{lite}

City of Marietta Performance Monitoring

ITERIS

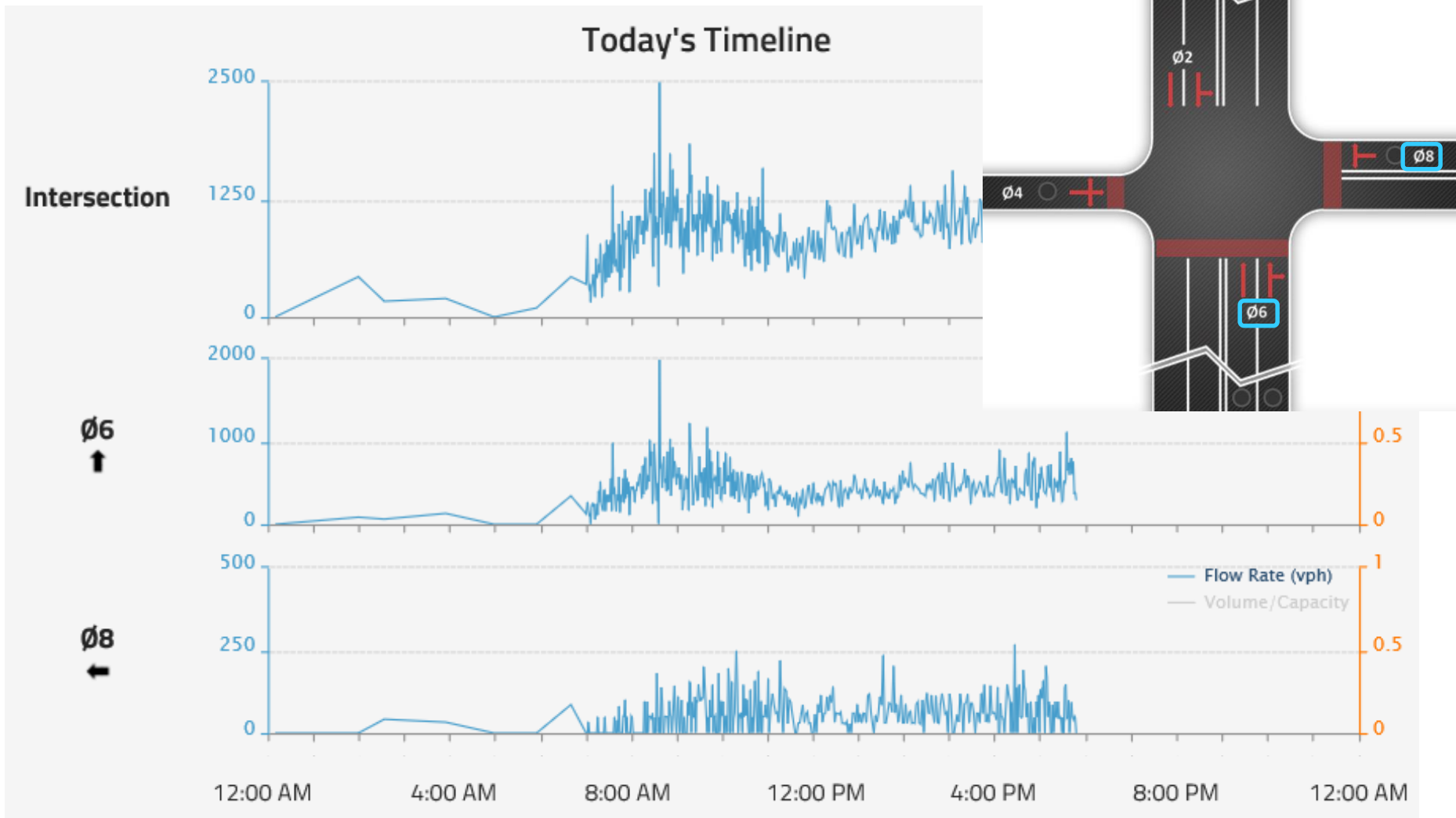
7:41:23 PM



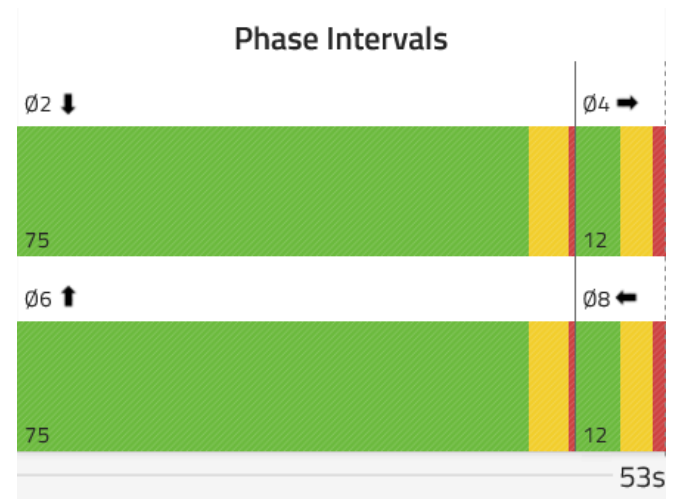
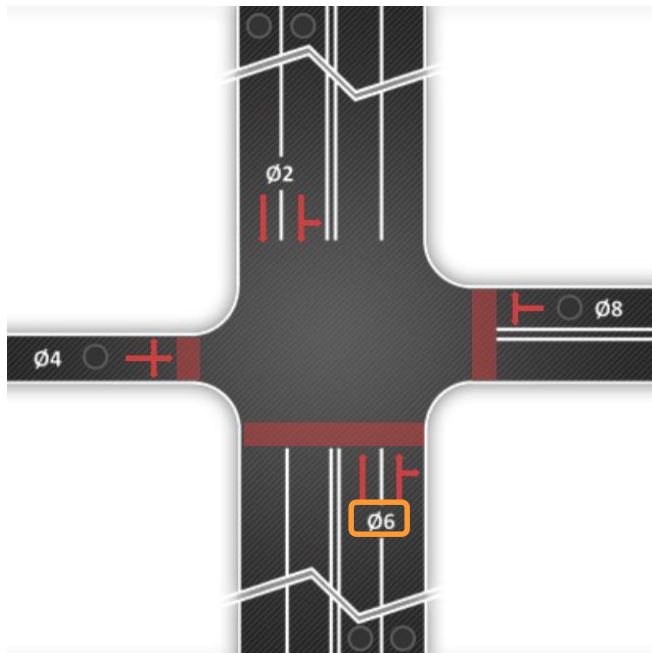
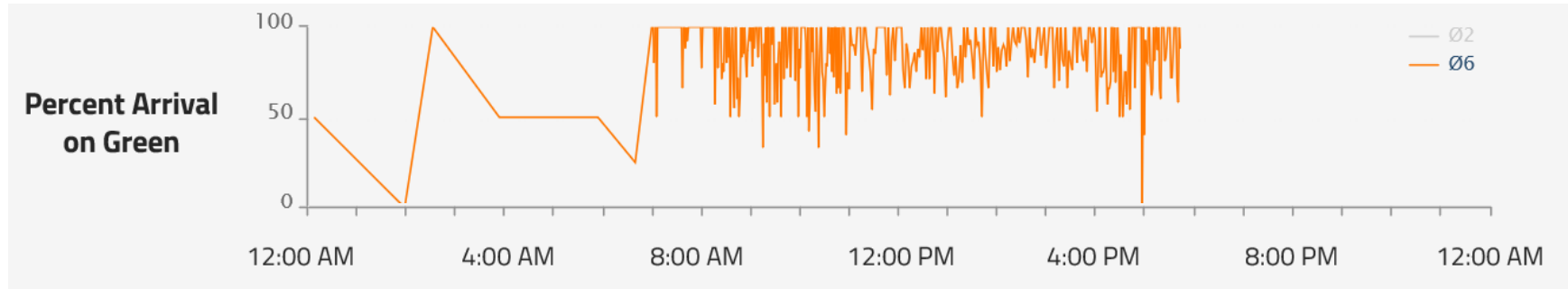
Previous Volume/Capacity

Start time	02	04	06	08	Intersection
7:36:09 PM	0.19	0.00	0.13	0.34	0.15
7:26:02 PM	0.32	0.00	0.00	0.00	0.15
7:00:12 PM	0.50	0.00	0.14	0.00	0.40
6:58:30 PM	0.04	0.00	0.07	0.00	0.07
6:56:31 PM	0.13	0.00	0.10	0.00	0.12

Real-time Intersection Monitoring



Real-time Intersection Monitoring



Questions?

Sandra Lennie, PE
Analytics Consultant
Phone: 510 984 1474
E-Mail: slennie@iteris.com



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